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June 2020

A METHOD TO ENHANCE TOUCH PAD USER EXPERIENCE BY DOMINANT HAND AND FINGER MOVING HOT AREA DETECTING

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Recommended Citation

INC, HP, "A METHOD TO ENHANCE TOUCH PAD USER EXPERIENCE BY DOMINANT HAND AND FINGER MOVING HOT AREA DETECTING", Technical Disclosure Commons, (June 18, 2020)
https://www.tdcommons.org/dpubs_series/3345



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A method to enhance touch pad user experience by dominant hand and finger moving hot area detecting

Abstract

Since Covid-19 it is common to WFH by laptop, when we put the laptop in left-hand side table or right-hand side table. One common issue is the right click or left click of touch pad is misjudge. For example, left click is detected as right click, vice visa.

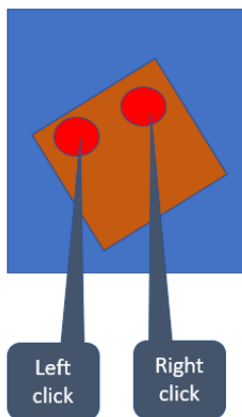
The reason for that is the touch pad use static pre-arrange area to define left click or right click event. When user put the laptop on the table aside, the angle between his palm and touch pad is twisted ,besides, the touch hot area is reshape, that is one reason for the misjudge since it use static area to detect the click event by pre-arranging fixing area.

For this we develop one method to reshape the touch pad hot area dynamically to precisely judge the left click and right click event.

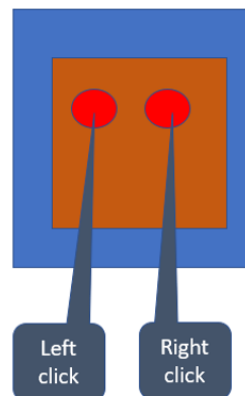
Method

Each user will have one comfortable area when he uses the touch pad of laptop. Accord to the different position of the laptop, the area will be changed dynamically. For example, the following is the use case for right hand dominate. The area of touch pad for user to right click or left click will be change accord user's placement of his laptop.

Right hand and laptop is in the left/right side of you

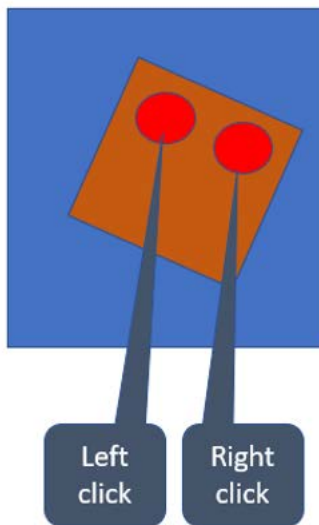


Right hand and laptop is in front of you

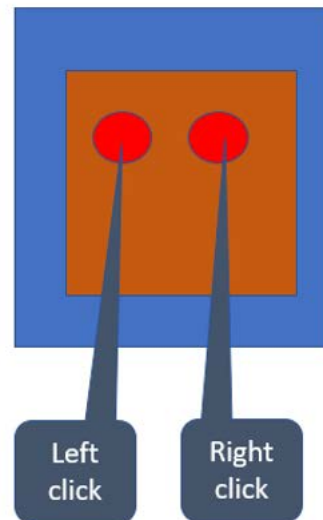


The following is the comfortable touch area for left hand dominate user.

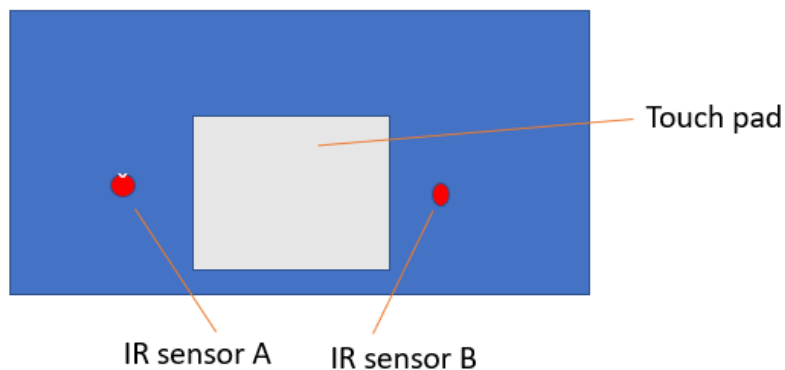
left hand and laptop is in the
left/right side of you



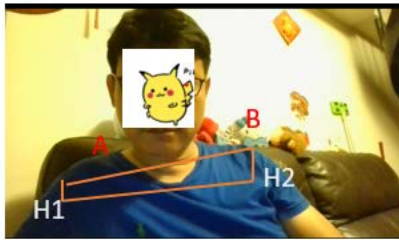
left hand and laptop is in front
of you



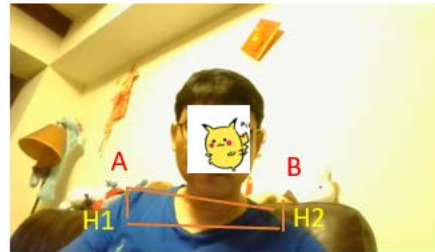
We use two LED sensors to detect whether the user is using left hand or right hand. The raw capacitance touch pad packet is used to detect the real user's finger's touch hot area. A build in camera with algorithm is used to detect whether the user is put the laptop in the righthand side or lefthand side. In general, user always move their finger on comfortable area. We use IR sensor to detect left /right hand. If IR sensor A return TRUE, then left hand dominated. If IR sensor B return TRUE then right hand dominated. As following.



The following picture is one example for right hand dominated.



Condition A: Laptop is on the right side



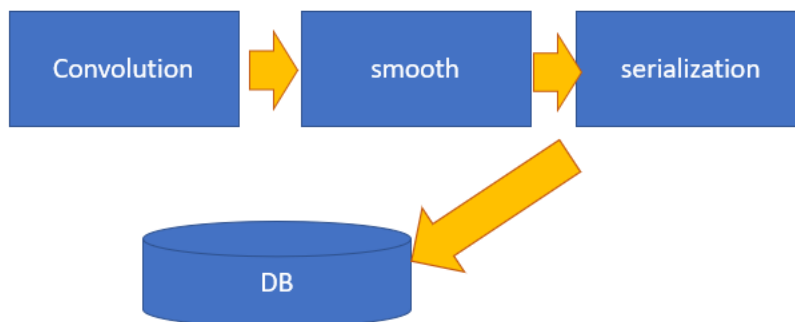
Condition B: Laptop is on the left side

We use the two shoulder as two point A,B and draw a line to link the two point as line X ,After that get the angle between the line X and horizontal line.

If $H1 < H2 \Rightarrow$ Case A If $H1 < H2 \Rightarrow$ Case B \rightarrow for right hand

If $H1 < H2 \Rightarrow$ Case B If $H1 < H2 \Rightarrow$ Case A \rightarrow for left hand

The data that CMOS touch pad send to host is a data area like matrix. We keep tracking the first 3 second data input and live training it by our TNN model to live detect the conformable area of the user. After we get the conformable area, we calculate the centroid of the area and draw a virtue rectangle. The left side of the rectangle is for left click trigger area, the right side of the rectangle is the right click trigger area. The following is the flow for hot area detection.



Convolution means to accumulate the possibility of each pixel of touchpad; Smooth means to adjust the pixel possibility of similar finer if this pixel is adjacent pixel of touch point; Serialization

means to converter it to normal format. DB means a pool of store this data. The following is the Algorithm for right / left hand detection.

Right_left_hand detection()

```
{
  If (sensor A ==TRUE )
    {HAND = LEFT HAND };
  Else if
    (sensor B ==TRUE)
    {
      HAND = RIGHT HAND );
    }
  return HAND;
}
```

Table_side_detection()

```
{
  if (Right_left_hand detection()==RIGHT)
    { If H1<H2 TABLE=right hand else ; If H1<H2 return TABLE=left hand; else if
    { If H1<H2 => TABLE=left hand ;If H1<H2 return TABLE= right hand; }
  }
```

Disclosed by Jane Pan, J.H Wang, and David Ke, HP Inc.